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Guttormson

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(54) **HAND TRUCK FOR TRANSPORTING A PLURALITY OF OBJECTS**

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See application file for complete search history.

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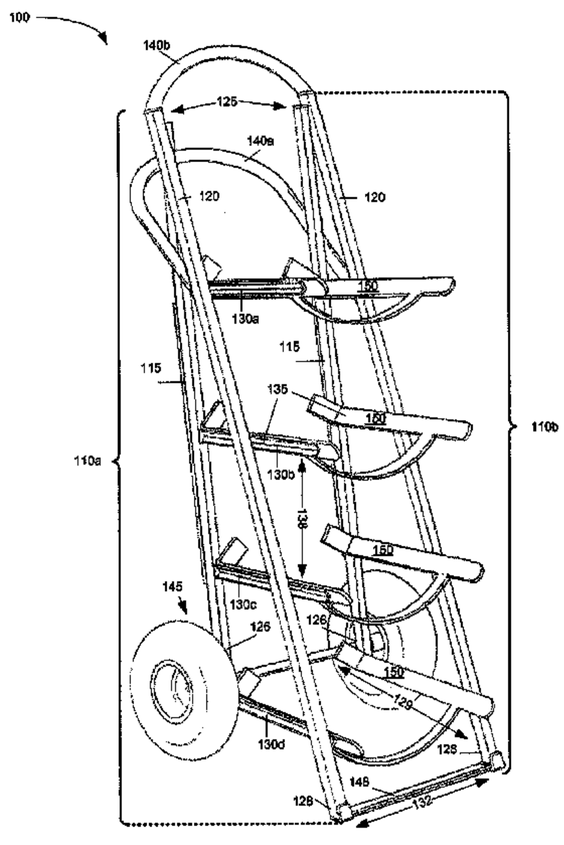
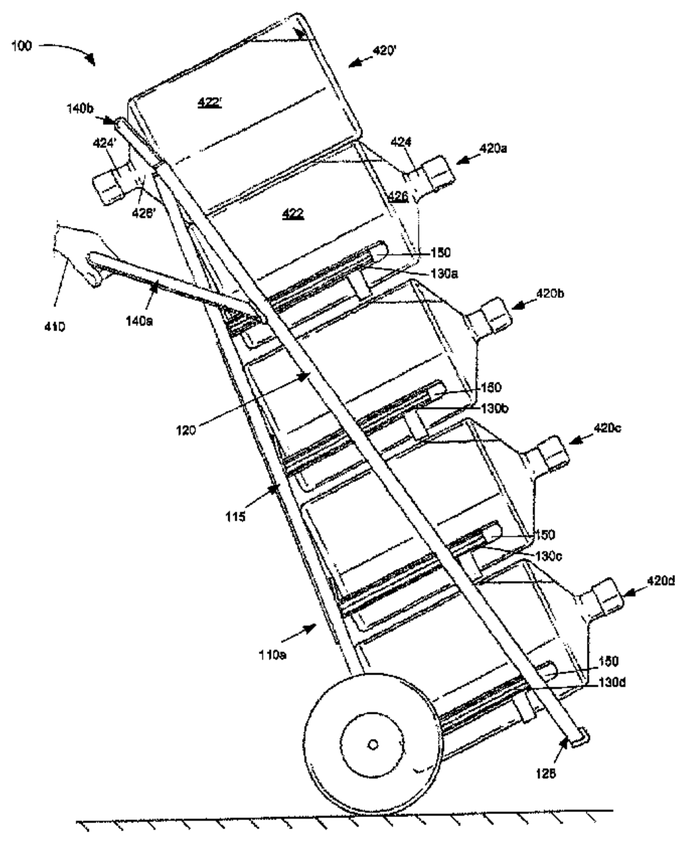
(57) **ABSTRACT**

A hand truck for transporting a plurality of objects is provided. The hand truck comprises a first frame portion and a second frame portion, each of which comprises: a first rail and a second rail, structurally joined proximal a handle end of each the rail; and a plurality of object supporting bars extending from the first rail to the second rail, each of the plurality of object supporting bars structurally supported by the first rail and the second rail, and separated from an adjacent object supporting bar by a distance approximate a stacking dimension of one of the plurality of objects. The second frame portion is laterally spaced from the first frame portion by an object supporting distance, such that the plurality of object supporting bars of the first frame portion and the plurality of object supporting bars of the second frame portion form a plurality of pairs of object supporting bars, each of the plurality of pairs of object supporting bars being substantially parallel and enabled to support at least one of the plurality of objects when the hand truck is in an upright position. The hand truck further comprises a handle portion proximal to, and structurally joining, a handle end of the first frame portion and a handle end of the second frame portion. The hand truck further comprises a wheel assembly joining the distal ends of each of the first rails of each of the first frame portion and the second frame portion.

25 Claims, 9 Drawing Sheets





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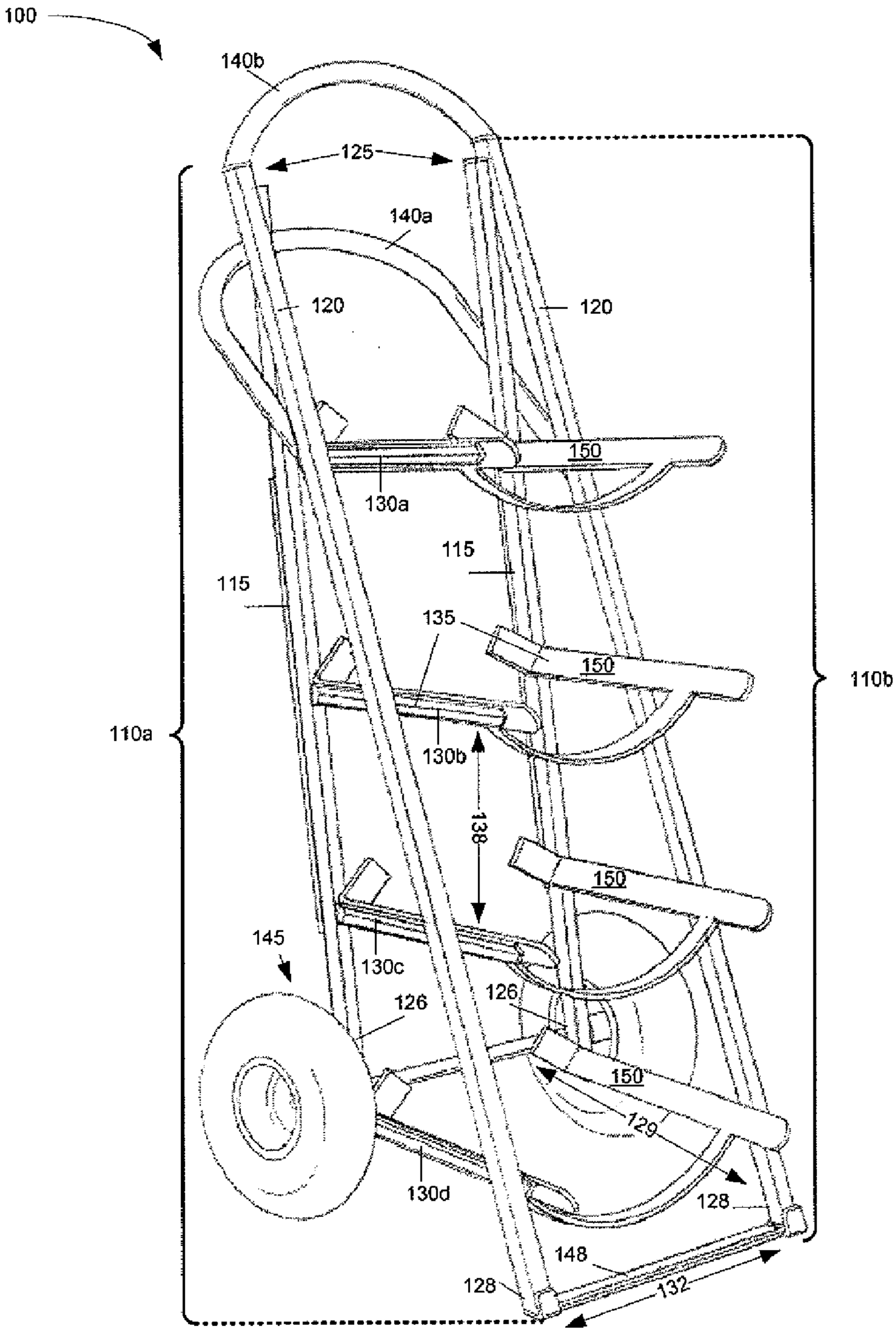
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115
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126
150
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130d
128
148
128
132

Fig. 1

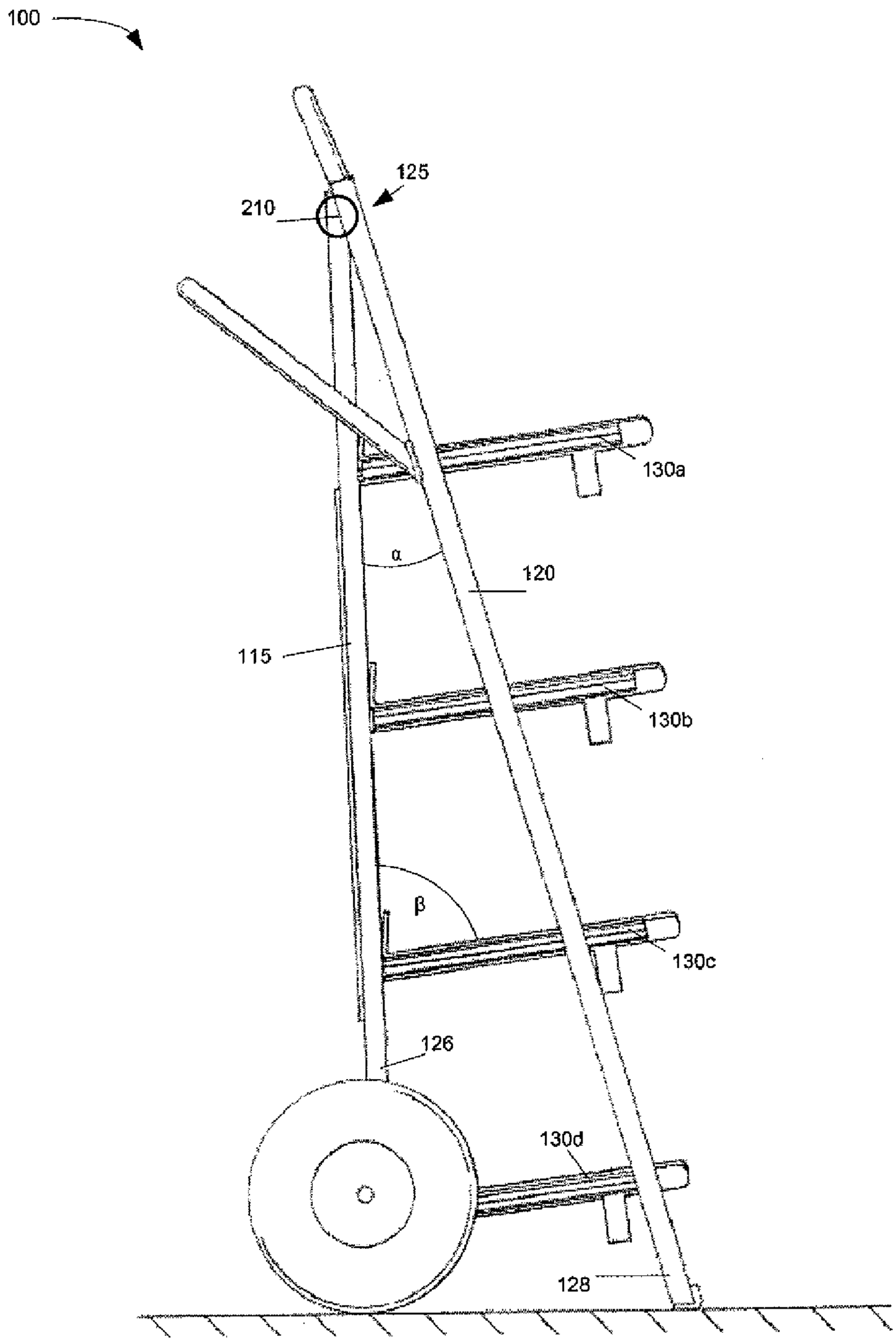
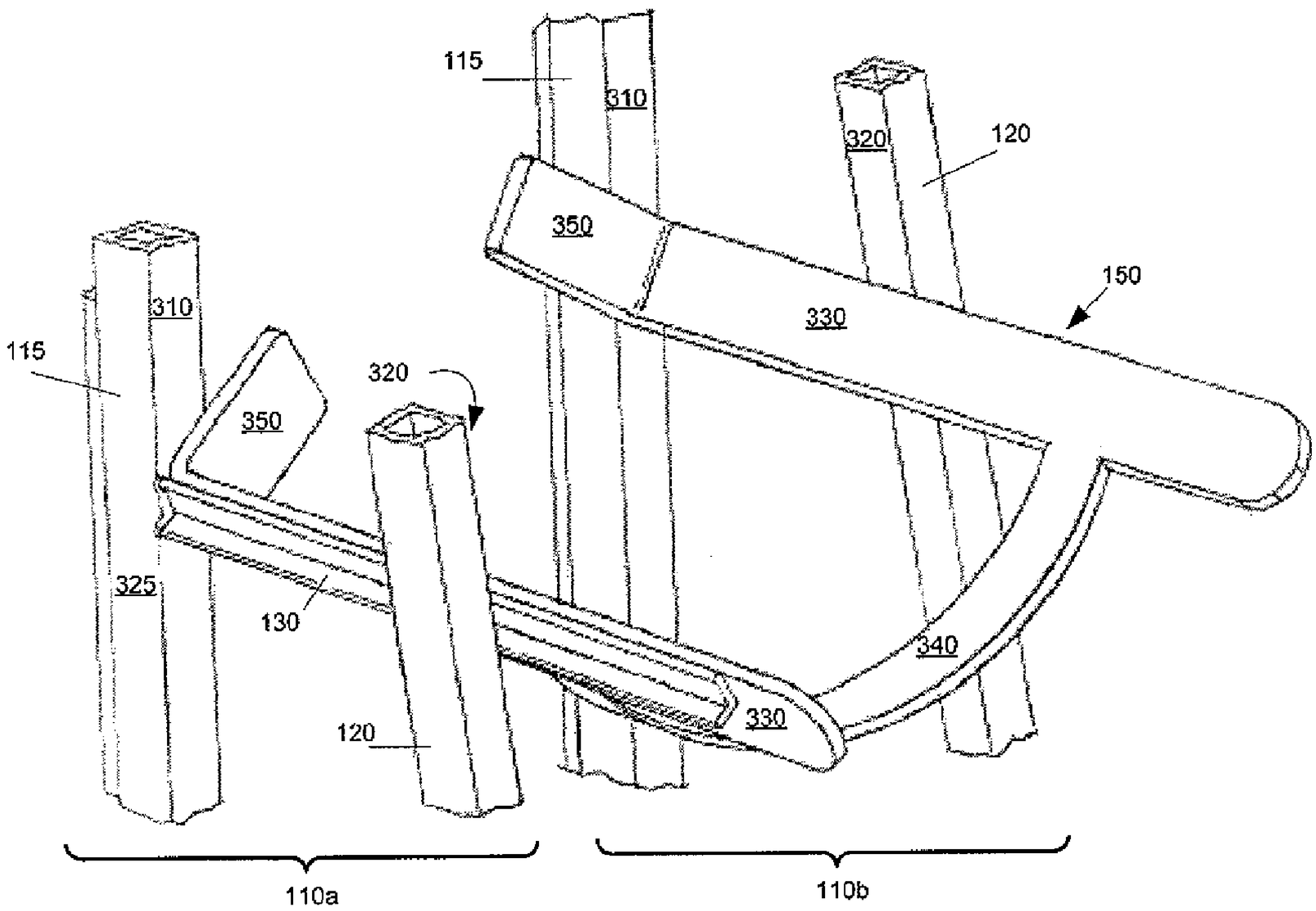


Fig. 2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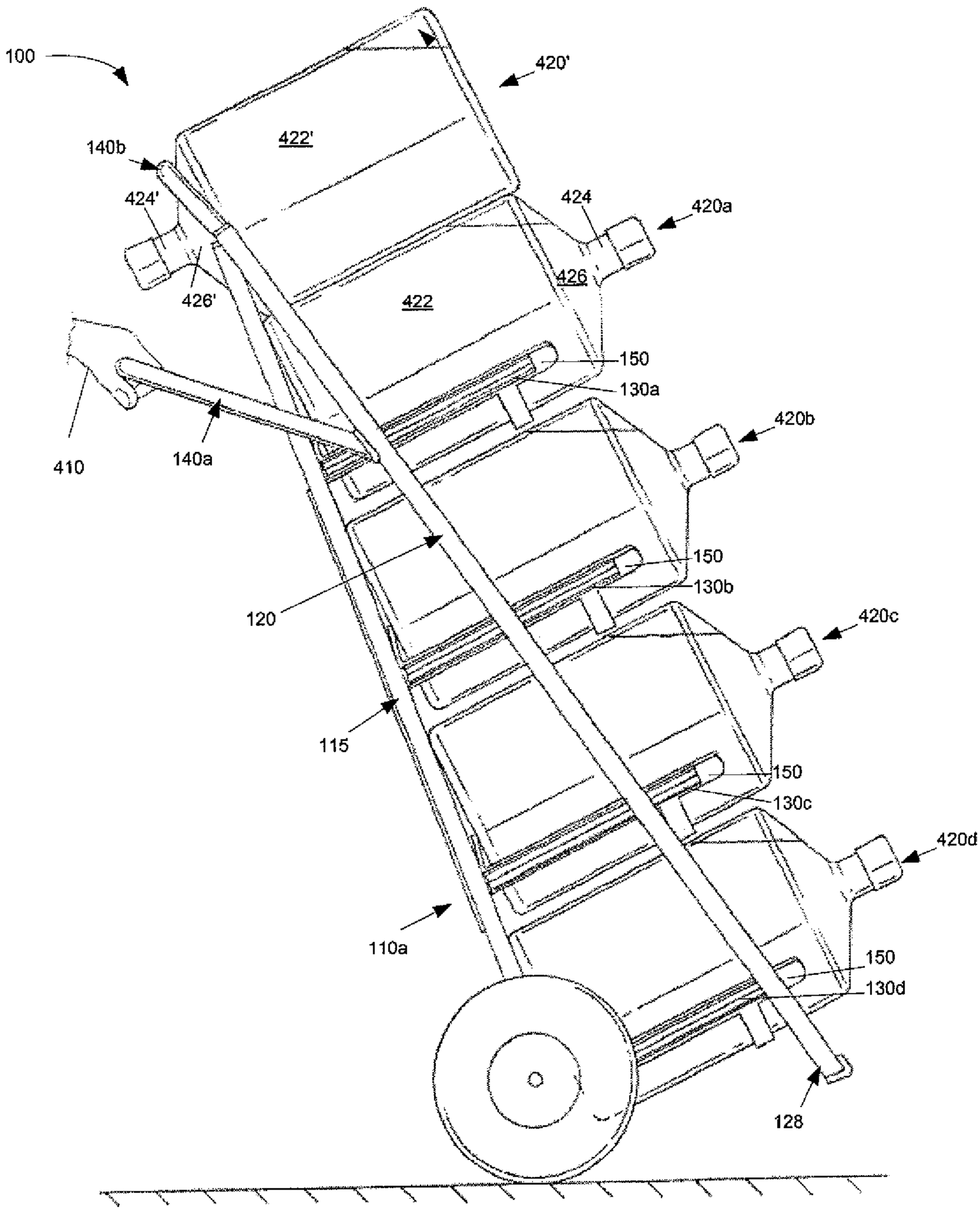
110b

Fig. 3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150
130c
420d
110a
150
130d
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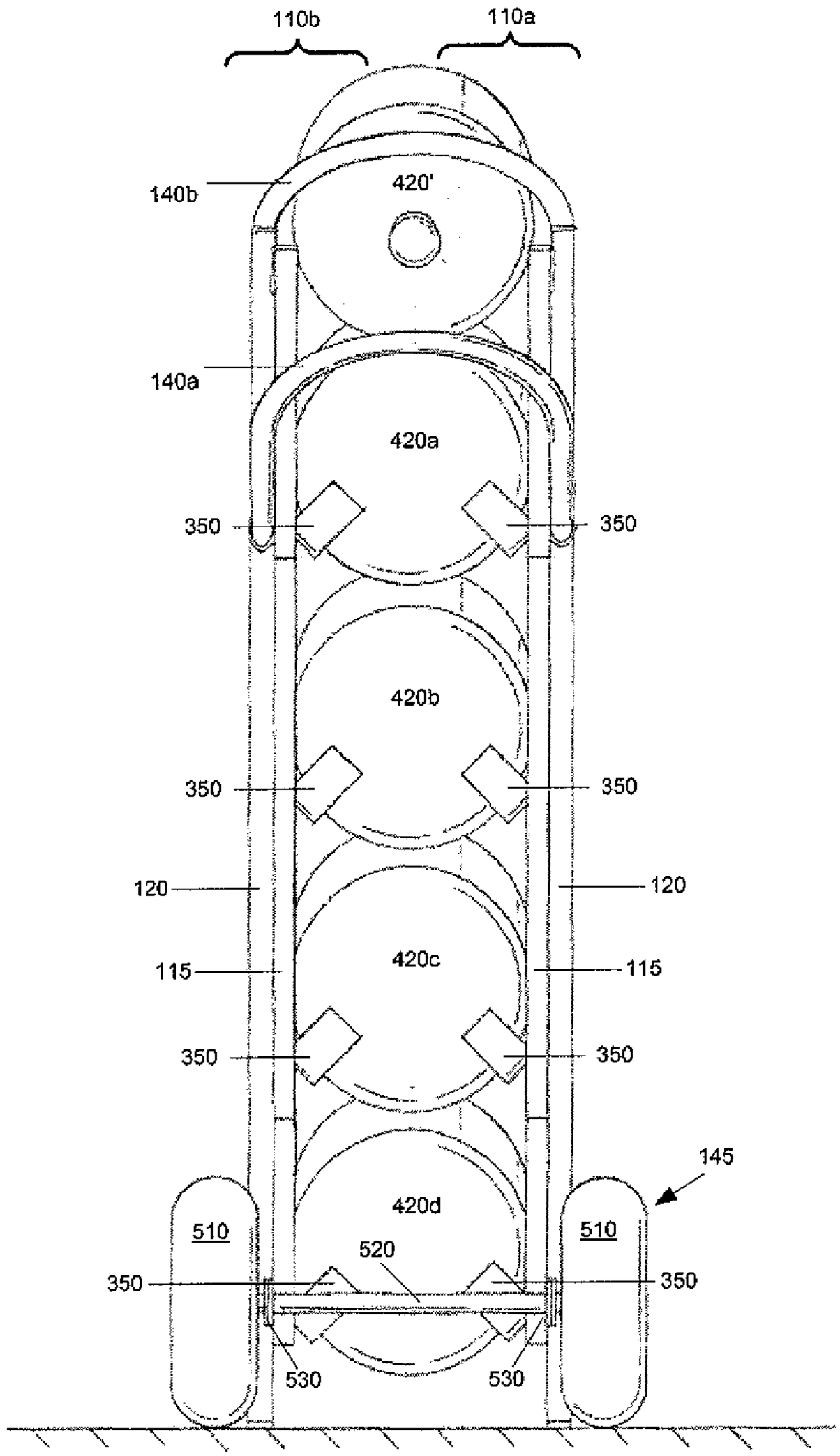
Fig. 4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420b
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420d
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530
530

Fig. 5

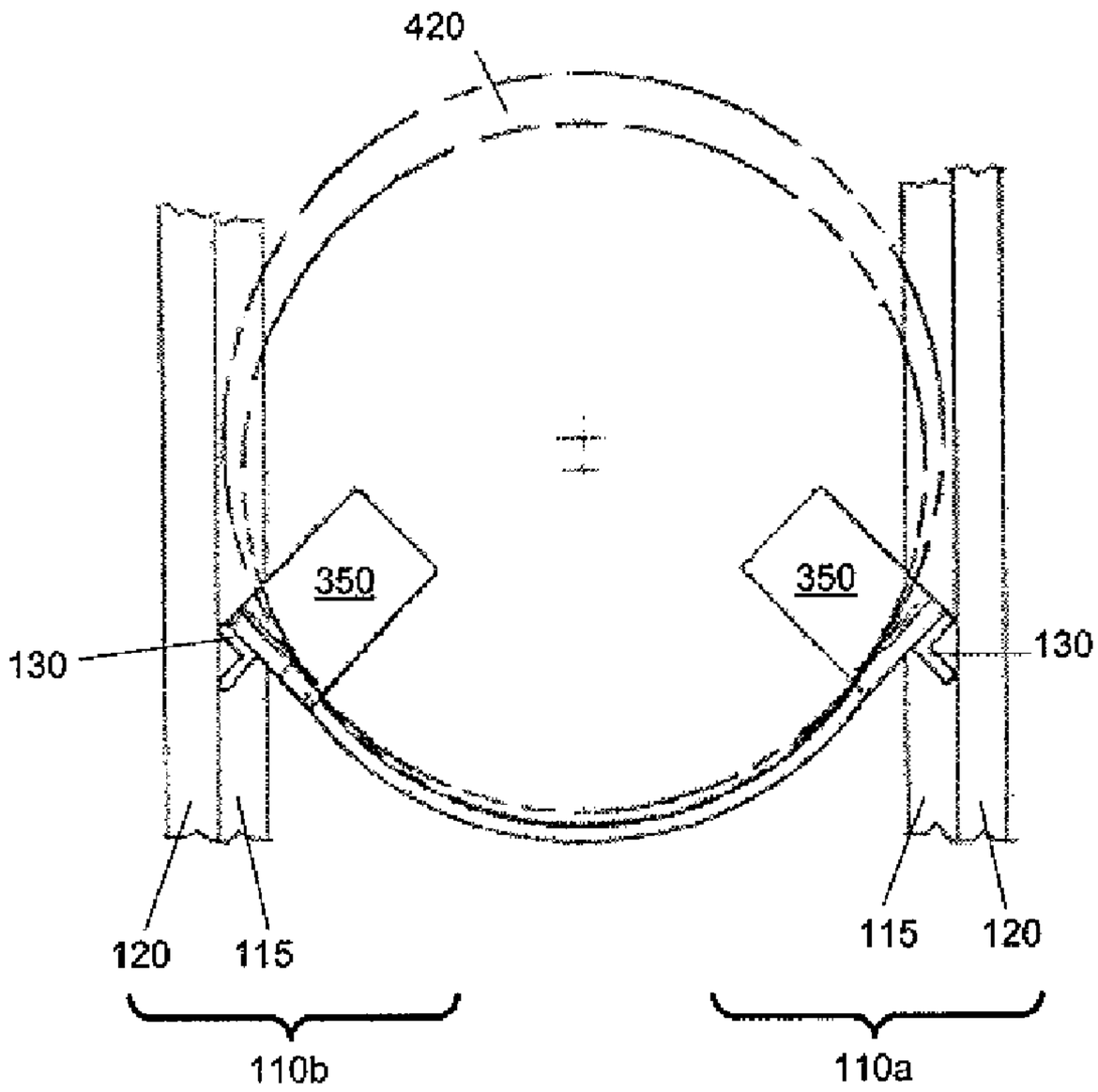

Fig. 6

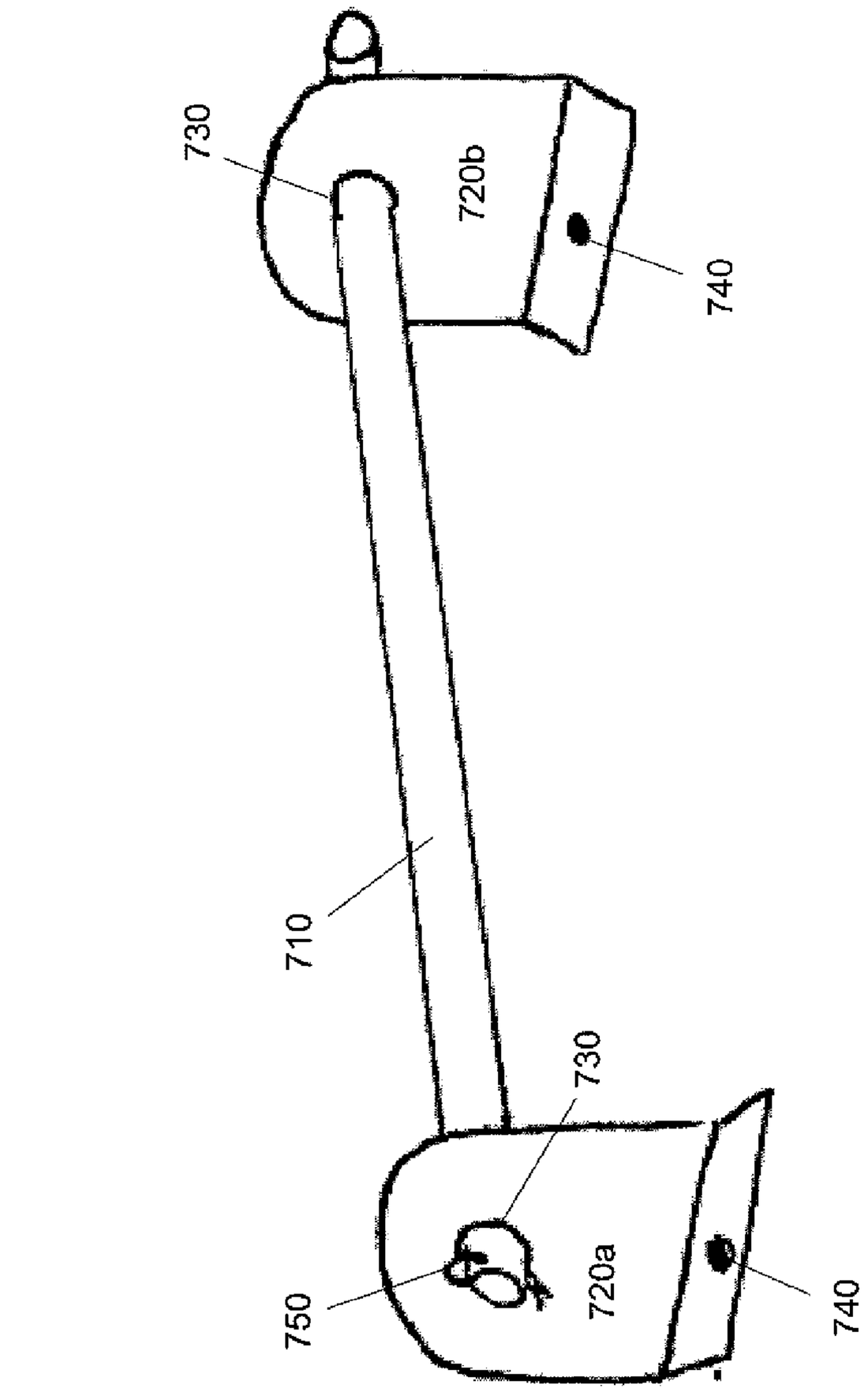

Fig. 7

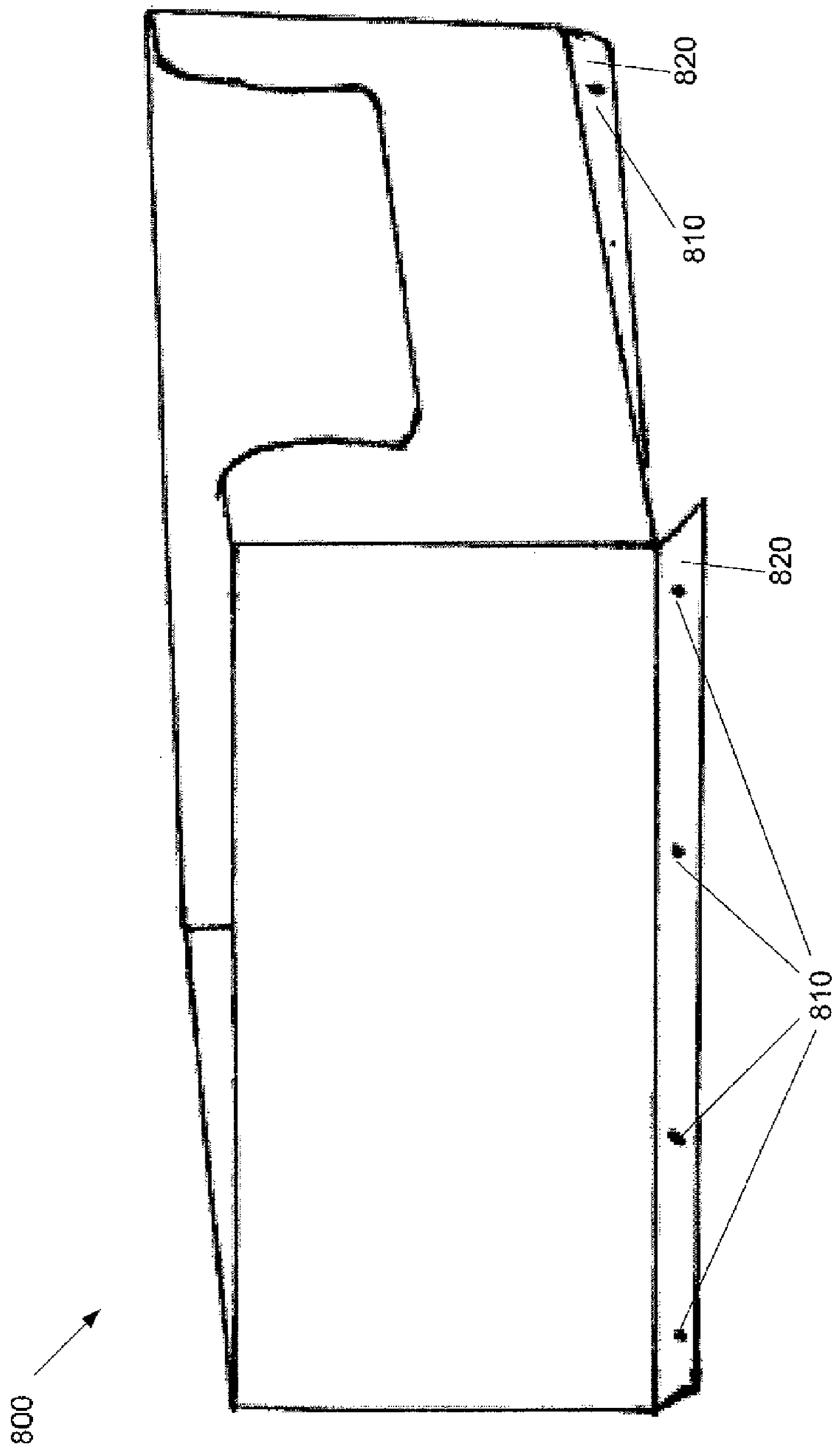

Fig. 8

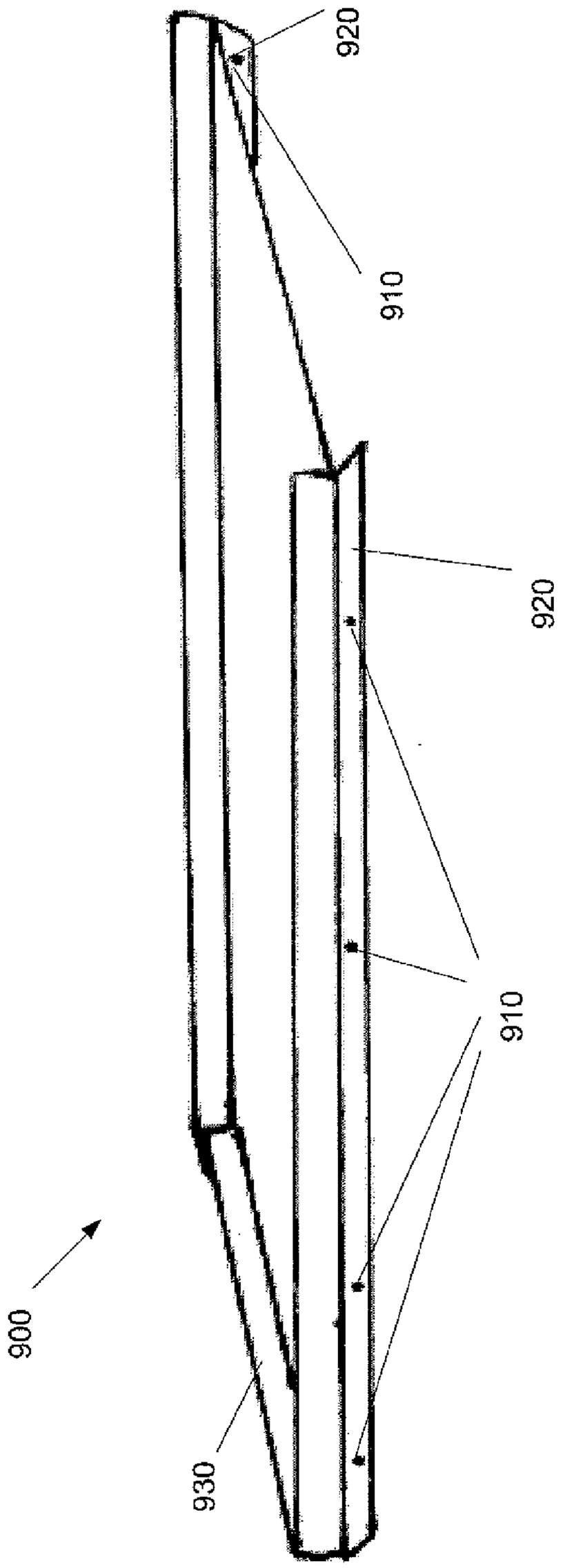

Fig. 9

HAND TRUCK FOR TRANSPORTING A PLURALITY OF OBJECTS

FIELD

The specification relates generally to hand trucks, and specifically to a hand truck for transporting a plurality of objects.

BACKGROUND

Distribution of drinking water to homes and businesses is often done via large cylindrical glass or plastic bottles with a narrow neck, adapted to fit into a dispensing unit, with each bottle holding a considerable volume of water, for example 3.5 gallons, 5 gallons etc. Consequently a full bottle is both heavy (e.g. 25 to 50 lbs or more) and awkward, making transport of the bottles problematic, especially as the bottles are hauled from a truck to the dispensing unit. For example, a driver may deliver 5 bottles to a business located on an upper floor of a building and necessarily must transport the 5 bottles from a truck, into the building and up to the business via an elevator. If the water bottles are stackable, a standard hand truck may sometimes be used, however there is no stability to this arrangement.

U.S. Pat. No. 5,104,135 teaches a wheeled handcart for transporting water bottles. Support appendages extend forward from a curved frame, spaced apart to accept and support up to four, five gallon water bottles. However, the curved frame supports the weight of all four bottles and will necessarily be constructed from a sturdy but heavy material. The weight of the handcart, therefore, becomes problematic for the driver as the handcart must generally be lifted in and out of a truck by hand. Furthermore, the weight of each bottle is translated to the frame via a pair of connection points which are generally off-centre from the center of mass of the water bottles and are hence subject to undue torque/stress.

U.S. Pat. No. 5,913,527 teaches a hand truck in which a pair of laterally spaced side rails are laterally connected by cross-wise braces to form a hand truck frame, and, a plurality of trays spaced along the frame for carrying water bottles oriented laterally. The lateral orientation of the cylindrical water bottles is problematic as the water tends to slosh along the cylindrical axis of each bottle, and hence the centre of mass of the loaded hand truck also shifts laterally, which can be awkward for the driver. Further, the hand truck is preferably constructed from aluminum to reduce weight as the frame is quite bulky: a steel frame would result in a hand truck that is too heavy, however the use of aluminum increases the cost of the hand truck considerably.

SUMMARY

An aspect of the specification provides a hand truck for transporting a plurality of objects. The hand truck comprises a first frame portion and a second frame portion, each of which comprises: a first rail and a second rail, structurally joined proximal a handle end of each the rail; and a plurality of object supporting bars extending from the first rail to the second rail, each of the plurality of object supporting bars structurally supported by the first rail and the second rail, and separated from an adjacent object supporting bar by a distance approximate a stacking dimension of one of the plurality of objects. The second frame portion is generally laterally spaced from the first frame portion by an object supporting distance, such that the plurality of object supporting bars of the first frame portion and the plurality of object supporting bars of the second frame portion form a plurality of pairs of object supporting bars, each of the plurality of pairs of object supporting bars being substantially parallel and enabled to support at least one of the plurality of objects when the hand truck is in an upright position. The hand truck further comprises a handle portion proximal to, and structurally joining, a handle end of the first frame portion and a handle end of the second frame portion. The hand truck further comprises a wheel assembly joining the distal ends of each of the first rails of each of the first frame portion and the second frame portion.

A wheel end of the first rail may be separated from a supporting end of the second rail by a hand truck supporting distance, each of the wheel end of the first rail and the supporting end of the second rail distal from the handle end, the hand truck supporting distance comprising a distance that enables the hand truck to freely stand when the hand truck is in an upright position, the hand truck being supported by the wheel assembly and the supporting ends of each the second rail.

The supporting end of each the second rail of the first frame portion and the second frame portion may be structurally joined by a toe strip.

Each of the plurality of object supporting bars may be structurally joined to the first rail and the second rail.

For each of the first frame portion and the second frame portion, the first rail and the second rail may form an angle, a narrow end of the angle located proximal the handle end of each the rail, a wide end of the angle formed by a wheel end of the first rail and a supporting end of the second rail.

For each of the first frame portion and the second frame portion, the first rail and the second rail may be structurally joined proximal the handle end of each the rail by one of the plurality of object supporting bars.

For each of the first frame portion and the second frame portion, the first rail and the second rail may be structurally joined proximal the handle end of each the rail by at least one of a structural fastener and a weld.

For each of the first frame portion and the second frame portion, the first rail and the second rail may be structurally joined proximal the handle end of each the rail by a joining portion which substantially separates the first rail and the second rail at the handle end of each the rail. The first rail and the second rail may also be substantially parallel.

Each of the plurality of pairs of object supporting bars may be joined by a lining portion adapted to accept and support the one of the plurality of objects, the weight of the one of the plurality of objects being translated to the first frame portion and the second frame portion by at least one of a pair of the object supporting bars and an associated lining portion. The lining portion may comprise a belly strap extending between each of the plurality of pairs of object supporting bars, the belly strap for engaging at least a portion of the one of the plurality of objects. Each of the plurality of objects may comprise at least one of glass and plastic, and the lining portion may be enabled to prevent damage to the glass and plastic. The lining portion may comprise a plastic material. The lining portion may comprise at least one of at least one of high density polyethylene (HDPE), polyvinyl chloride (PVC) and Kevlar. The lining portion may comprise a flexible lining portion enabled to grip the one of the plurality of objects. Each of the plurality of objects may comprise a five gallon water bottle. The lining portion may comprise an object abutment portion extending from an end adjacent the first rail, the object abutment portion for preventing the one of the plurality of objects from sliding towards the first rail of each of the first frame portion and the second frame portion and.

Each of the plurality of object supporting bars may be tilted towards the handle end of the first rail, forming an acute angle with the first rail, such that the one of the plurality of objects slides towards the first rail when supported by one of the plurality of pairs of object supporting bars, when the hand truck is in an upright position.

Each of the plurality of object supporting bars may comprise an object abutment portion extending from an end adjacent the first rail, the object abutment portion for preventing the one of the plurality of objects from sliding towards the first rail of each of the first frame portion and the second frame portion.

The hand truck may further comprise a second handle portion proximal to, and structurally joining, a handle end of the first frame portion and a handle end of the second frame portion, wherein the handle portion enables a user to apply a moment of force to the handcart to disengage the supporting ends of each the second rails from the ground and ergonomically transport the hand cart via the wheel assembly when the hand cart is in a substantially upright position, and the second handle portion enables a user to ergonomically transport the hand cart via the wheel assembly when the hand cart is in a substantially tilted position. When the one of the plurality of objects is supported by an uppermost pair of object supporting bars, the second handle portion may be further enabled to prevent another one of the plurality of objects stacked on the one of the plurality of objects from sliding between the first rail of each of the first frame portion and the second frame portion.

The plurality of pairs of object supporting bars may comprise a bottommost pair extending from the wheel end of each the first rail, an uppermost pair extending proximal the handle end of each the first rail, and at least two middle pairs evenly spaced between the bottommost pair and the uppermost pair.

The first frame portion and the second frame portion may comprise at least one of steel and aluminum.

The first rail and the second rail may be structurally joined proximal a handle end of each the rail via a hinge, and the plurality of object supporting bars extending from the first rail to the second rail are structurally joined to the first rail via another hinge.

The hand truck may further comprise at least one of a lining portion, a spool supporting portion, a box or a tray extending between at least one of the pairs of object supporting bars.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments are described with reference to the following figures, in which:

FIG. **1** depicts a perspective view of a hand truck for transporting a plurality of objects, according to a non-limiting embodiment;

FIG. **2** depicts a side plan view of a hand truck for transporting a plurality of objects, according to a non-limiting embodiment;

FIG. **3** depicts detail of an optional lining portion and an arrangement of the frame of a hand truck for transporting a plurality of objects, according to non-limiting embodiments;

FIG. **4** depicts a side plan view of a hand truck for transporting a plurality of objects, in use, according to a non-limiting embodiment;

FIG. **5** depicts a rear plan view of a hand truck for transporting a plurality of objects, according to a non-limiting embodiment;

FIG. **6** depicts on object abutment portion of a hand truck for transporting a plurality of objects, according to a non-limiting embodiment;

FIG. **7** depicts a perspective view of a spool supporting apparatus for a hand truck for transporting a plurality of objects, according to a non-limiting embodiment;

FIG. **8** depicts a perspective view of a box adapted for attachment to a pair of object supporting bars of a hand truck for transporting a plurality of objects, according to a non-limiting embodiment; and

FIG. **9** depicts a perspective view of a tray adapted for attachment to a pair of object supporting bars of a hand truck for transporting a plurality of objects, according to a non-limiting embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

FIG. **1** depicts a perspective view of a hand truck **100** for transporting a plurality of objects, according to a non-limiting embodiment. The hand truck **100** generally comprises a first frame portion **110***a* and a second frame portion **110***b*, generically referred to as a "frame portion **110**" and collectively as "frame portions **110**". Each frame portion **110** comprises a first rail **115** and a second rail **120** which are structurally joined, proximal a handle end **125** of each of the first rail **115** and the second rail **120**. The structural nature of the join between the first rail **115** and the second rail **120** proximal the handle end **125** will be described below.

Further, a wheel end **126** of the first rail **115** is separated from a supporting end **128** of the second rail **120** by a hand truck supporting distance **129** (described below). Each of the wheel end **126** of the first rail **115** and the supporting end **128** of the second rail **120** is distal from the handle end **125**.

Each frame portion **110** further comprises a plurality of object supporting bars **130***a*, **130***b*, **130***c* and **130***d*, generically referred to as an "object supporting bar **130**" and collectively as "object supporting bars **130**", extending from, the first rail **115** to the second rail **115**, the object supporting bars **130** being structurally supported by the first rail **115** and the second rail **120**. In some embodiments each of the plurality of object supporting bars **130** are structurally joined to the first rail and the second rail **130**, for example via a weld or a suitable fastener. In the perspective of FIG. **1**, only object supporting bars **130** of the first frame portion **115** are visible, the object supporting bars **130** of the second framer portion **110**b being hidden by an optional lining portion **150**, described below. However it is understood that the hand truck **100** is generally symmetrical about a centre longitudinal plane, and hence object supporting bars **130** also extend from the second frame portion **120**. Further, while the embodiment depicted in FIG. **1** comprises four object support bars **130** for each frame portion, embodiments with greater or fewer object supporting bars **130** are within the scope of the present specification. In general, the number of object support bars **130** on each frame portion **110** is representative of the number of objects that are supportable by the hand truck **110**.

The first frame portion **110***a* and the second frame portion **100***b* are laterally spaced by an object supporting distance **132** (discussed below) such that the plurality of object supporting bars **130** of the first frame portion **110***a* and the plurality of object supporting bars **130** of the second frame portion **119***b* form a plurality of pairs of object supporting bars **130**, for example the pair **135** depicted in FIG. **1**, each of the plurality of pairs of object supporting bars **130** being substantially parallel and enabled to support at least one of the plurality of objects, for example when the hand truck **100** is in an upright position. In some embodiments, each of the plurality of objects may have a longitudinal axis (for example see the water bottles of FIGS. **4**, **5** and **6**), and the pairs of object

supporting bars **130** are generally configured to support at least one of the plurality of objects along the longitudinal axis, the longitudinal axis of object being generally parallel to the object supporting bars **130** when supported. However, in other embodiments, the pairs of object supporting bars **130** may be configured to support the plurality of objects along an axis other than a longitudinal axis, as described below.

In general, each of the plurality of the object supporting bars **130** are separated from an adjacent object supporting bar **130** along the associated frame portion **110** by an object stacking distance **138** approximate a stacking dimension of one of the plurality of objects. For example, in one non-limiting embodiment, as will be described below with reference to FIGS. **3** and **4**, the plurality of objects may be water bottles that are to be transported via the hand truck **130**, and supported by pairs of the object supporting bars **130**. Hence, the object stacking distance **138** is such that a water bottle is stackable on each pair of object supporting bars **130**, while enabling the stacking of another water bottle onto an adjacent pair of object supporting bars **130**, without interference. In this embodiment, the object stacking distance **138** may approximately comprise a diameter of a water bottle. In some embodiments, the object stacking distance **138** may be such that water bottles stacked on adjacent pairs of object supporting bars **130** are in contact, while in other embodiments, the object stacking distance **138** may be such that water bottles stacked on adjacent pairs of object supporting bars **130** are separated. In yet further embodiments, each water bottle may be configured for stackability via interacting grooves and ridges, for example. In these embodiments, the object stacking distance **138** may be such that when water bottles are stacked on adjacent pairs of object supporting bars **130**, the ridge of a water bottle may slide into a groove of the adjacent water bottle, the weight of each water bottle however being supported by the corresponding pair of object supporting bars **130**. Hence, in these embodiments, the object stacking distance **138** is less than a diameter of a water bottle.

Similarly, the object supporting distance **132** is a distance that enables an object to be supported by a pair of object supporting bars **130**, such as the pair **135**. For example, in some embodiments the object supporting distance **132** is a distance that enables the water bottles to be supported by the pairs of the object supporting bars **130**, along the length of the object supporting bars **130**. Hence, in these embodiments, the object supporting distance **132** is less than the diameter of a water bottle. However, in some embodiments, as described below, each pair of object supporting bars **130** are joined by the optional lining portion **150**, with each optional lining portion **150** adapted to accept and support one of the plurality of objects, the weight of one of the plurality of objects being translated to the first frame portion **110***a* and the second frame portion **110***b* by the object supporting bars **130**. In these embodiments, the object supporting distance **132** may be approximately equal to or even greater than the diameter of a water bottle, the optional lining portion **150** providing the substantial engagement of the water bottle.

Turning now to the hand truck supporting distance **129**, the hand truck supporting distance **129** comprises a distance that enables the hand truck **100** to freely stand when the hand truck **100** is in an upright position, the hand truck **100** being supported by the wheel assembly **145** and the supporting ends **128** of each of the second rails **120**. In some embodiments, each of the supporting ends **128** of each of the second rails **120** of the first frame portion **110***a* and said second frame portion **110***b* are structurally joined by a toe strip **148**, however embodiments of the hand truck **100** that do not include the toe strip **148** are within the scope of the present specification. If present, the toe strip **148** provides additional stability to the hand truck **100**, and further enables a user loading or unloading the hand truck **100** to immobilize and/or stabilize the hand truck **100** by stepping on the toe strip **148**. While the toe strip **148** depicted in FIG. **1** generally comprises a bar extending between each of the second rails **120**, the configuration of the toe strip **148** is not particularly limiting. For example, in alternative embodiments, the toe strip **148** may further comprise a plate configured to extend along the ground when the hand truck **100** is freely standing.

The hand truck **100** further comprises at least one handle portion, such as handle portion **140***a* and **140***b*, proximal to, and structurally joining, a handle end of the first frame portion **110***a* and a handle end of the second frame portion **110***b*. In general the handle portion **140***a* enables a user to apply a moment of force to the handcart **100** to disengage the supporting ends **128** of each the second rails **120** from the ground and ergonomically transport the hand cart **100** via a wheel assembly **145** when the hand cart **100** is in a substantially upright position. The wheel assembly **145** further structurally joins the distal ends of each of the first rails **115** of each of the first frame portion **110***a* and the second frame portion **110***b*. Details of the wheel assembly **145** are described below with reference to FIG. **5**. While not essential to present embodiments, the handle portion **140***b* enables a user to ergonomically transport the hand cart **100** via the wheel assembly **145** when the hand cart **110** is in a substantially tilted position, for example when the hand cart is being transported from a truck to building. However, it is understood that the hand cart **100** may also be transported via the handle portion **140***a*, when the hand cart **110** is in a substantially tilted position, and a hand truck **100** without the handle portion **140***b* are within the scope of the present embodiments.

Attention is now directed to FIG. **2**, which depicts a side plan view of the hand cart **100** of FIG. **1**, according to a non-limiting embodiment. In this embodiment, for each of the first frame portion **110***a* and the second frame portion **110***b* the first rail **115** and the second rail **120** form an angle α, a narrow end of the angle α located proximal the handle end **125** of each of the first rail **115** and the second rail **120**, a wide end of the angle α formed by the wheel end **126** of the first rail **110** and the supporting end **128** of the second rail **120**. Further, in these embodiments the second rail **120** is offset laterally from the first rail **115**, and substantially overlaps the first rail **115** in the area **210**, proximal the handle end **125**.

However, the exact configuration of the second rail **120** relative to the first rail **115** is not strictly limiting, and other configurations of the second rail **120** relative to the first rail **115** are within the scope of present embodiments, as long as for each of the frame portions **110**, each of the object supporting bars **130** are structurally supported by the first rail **115** and the second rail **120**. This allows the weight of the plurality of objects to be structurally supported by both of the first rail **115** and the second rail **120** of each frame portion **110**. Consequently, lighter gauge materials may be used to construct portions of the hand cart **110**, for example lighter gauge metal tubing for the first rail **115** and the second rail **120**, as depicted in FIG. **3** described below, saving on both weight and cost. Indeed, a successful prototype of the hand cart **110** of FIGS. **1** and **2**, constructed primarily from steel tubing and angle iron as appropriate, and with four pairs of object supporting bars **130** for transporting four 5 gallon water bottles supported thereon, has proven to be approximately 10 lbs lighter than other commercially available hand carts configured to transport four, 5 gallon water bottles, for example handcarts taught in U.S. Pat. Nos. 5,104,135 and 5,913,527, including commercially available hand carts manufactured from the more

expensive aluminum. However, the materials used to construct the hand cart **100** are not to be considered particularly limiting, the frame portions **110** being generally constructed from at least one of steel, iron, aluminum or any other appropriate material.

Further, as described above, the first rail **115** and the second rail **120** are structurally joined proximal the handle end **125** of each of the first rail **115** and the second rail **120** to provide stability in each frame portion **110**, however the nature of the structural join is not particularly limiting. For example, in the embodiment depicted in FIGS. **1** and **2**, the first rail **115** and the second rail **115** may be welded together in the area **210**, located at the apex of the angle α. However, in other embodiments, the first rail **115** and the second rail **115** may be structurally together in the area **210** via any suitable structural fastener. A non-limiting example of a suitable structural fastener is a nut and bolt.

A person of skill in the art would understand that the first rail **115** and the second rail **120** are generally structurally joined proximal the handle end **125** of each of the first rail **115** and the second rail **120** via an uppermost object supporting bar **130***a*. In these embodiments, the structural join between the first rail **115** and the second rail **120** via an uppermost object supporting bar **130***a* may be sufficient to provide the desired stability in each frame portion **110**, hence embodiments where the first rail **115** and the second rail **120** are not welded or fastened together at the area **210** are within the scope of the present specification. For example, in some embodiments the first rail **115** and the second rail **120** may not overlap proximal the handle end **125** (e.g. one or both of the first rail **115** and the second rail **120** may not extend enough towards the handle end **125** to overlap and/or the angle a may be such that the first rail **115** and the second rail **120** do not overlap), and the structural join provided via the uppermost object supporting bar **130***a* may provide sufficient stability in the respective frame portion **110**.

In other embodiments where the first rail **115** and the second rail **120** do not overlap proximal the handle end **125**, for each frame portion **110**, the first rail **115** and the second rail **115** may be structurally joined proximal the handle end **125** of each of the first rail **115** and the second rail **120** by a joining portion (not depicted), which extends between the of the first rail **115** and the second rail **120** and is structurally joined to each. In some of these embodiments, the first rail **115** and the second rail **120** may be substantially parallel.

A person of skill in the art would further understand from FIG. **2** that each of the plurality of object supporting bars **130** is tilted towards the handle end **125** of the first rail **115**, forming an acute angle β with the first rail **115**, such that the one of the plurality of objects slides towards the first rail **115** when supported by one of the plurality of pairs of object supporting bars **130**, when the hand truck **100** is in an upright position. This may be further observed in FIG. **4**, described below.

Attention is now directed to FIG. **3** which depicts detail of one of the optional lining portions **150**, which joins each pair of object supporting bars **130**, as well as detail of the arrangement of an object supporting bar **130**, the first rail **115**, and the second rail **120**, each according to a non-limiting embodiment. A person of skill in the art would understand from FIG. **3** that, in the depicted non-limiting embodiments, each of the first rail **115** and the second rail **120** comprises tubing of a substantially square cross-section, and that the object supporting bar **130** comprises angle iron, the object supporting bar **130** extending from an object side face **310** of the first rail **115**, and structurally joined to the object side face **310**. A person of skill in the art would further understand the second rail **120** is laterally offset from the first rail **115**, away from the object supporting bar **130**, such that the object supporting bar **130** is able to extend past the second rail **120**, and is structurally joined to an inward lateral face **320** of the second rail **120**. Hence, in the depicted non-limiting embodiment, the distance between the second rails **120**, of each of the first frame portion **110***a* and the second frame portion **110***b* is larger than the distance between the first rails **115**, of each of the first frame portion **110***a* and the second frame portion **110***b*, with an outward lateral face **325** of the first rail **115** being substantially in the same plane as the inward lateral face **320** of the second rail **120**. However, other arrangements of the object supporting bar **130**, the first rail **115**, and the second rail **120** are within the scope of present embodiments.

The optional lining portion **150** depicted in FIG. **3** comprises a pair of bar lining portions **330**, each of which line associated object supporting bars **130** in the pair of object supporting bars **130**. The optional lining portion **150** of FIG. **3** is generally adapted accept and support generally cylindrical objects, such as a water bottle. Hence, the optional lining portion **150** of FIG. **3** further comprises a belly strap **340** which joins each of the bar lining portions **330**, the belly strap **340** adapted to receive a curved wall of a cylindrical object. However, in other embodiments, the belly strap **340** may be adapted to accept and support objects of other shapes, for example objects with corners, objects which are curved but not cylindrical, and the like, the belly strap **140** being generally configured to mate with at least a portion of the object.

Hence, in embodiments that comprise optional lining portions **150**, each of the plurality of pairs of object supporting bars **130** are joined by a lining portion adapted to accept and support the one of the plurality of objects, the weight of the one of the plurality of objects being translated to the first frame portion **110***a* and the second frame portion **110***b* by the object supporting bars **130**, the object being substantially engaged by the optional lining portion **150**. This may be seen more fully in FIGS. **4**, **5** and **6**, described below.

Each bar lining portion **330** is attached to the associated object supporting bar **130** via a suitable fastener. In some embodiments the suitable fastener comprises an adhesive. In other embodiments, the suitable fastener comprises a rivet joining the bar lining portion **330** and the associated object supporting bar **130**. In further embodiments, the suitable fastener comprises a low profile screw and nut joining the bar lining portion **330** and the associated object supporting bar **130**, the head of the screw holding the bar lining portion **330** in place on the object supporting bar **130**. However, other suitable fasteners will occur to a person of skill in the art and are within the scope of present embodiments.

In some embodiments, however, the optional lining portion **150** may comprise only the belly strap **340**, and not the bar lining portions **330**, the belly strap **340** being attached to each of the pair of object supporting bars **130** via a suitable fastener.

In some embodiments, the optional lining portion **150** generally a material suitable for interaction with the object being supported. For example, in embodiments where each of the plurality of objects comprises at least one of glass and plastic (e.g. a glass water bottle or a plastic water bottle), the optional lining portion **150** is enabled to prevent damage to the glass and plastic. In some of these embodiments, the optional lining portion **150** comprises at least one of high density polyethylene, polyvinyl chloride (PVC) and kevlar, however other suitable materials are within the scope of present embodiments.

In some embodiments, the optional lining portion **150** is generally flexible and hence enabled to grip the one of the

plurality of objects. For example in some embodiments where the optional lining portion **150** of FIG. **3** comprises high density polyethylene, the weight of a water bottle placed onto the flexible optional lining portion **150** will generally cause the lining portion **150** to flexibly deform around the water bottle, in effect gripping the water bottle. Examples of embodiments where the optional lining portion **150** may be generally flexible are also depicted in FIGS. **4**, **5** and **6**.

As further depicted in FIG. **3**, in some embodiments, at least one of each of the plurality of object supporting bars **130** and the optional lining portion **150** comprises an object abutment portion **350** extending from an end adjacent the first rail **115**, the object abutment portion **350** configured to prevent the one of the plurality of objects from sliding towards the first rail **115** of each of the first frame portion **110***a* and the second frame portion **110***b*. This may be further observed in FIGS. **5** and **6**, described below.

Attention is now directed to FIG. **4**, which depicts a side plan view of the hand cart **100** of FIG. **1** in use, according to a non-limiting embodiment, the hand cart **100** being used to transport five, five gallon water bottles. From FIG. **4**, a person of skill in the art would understand that a user, for example a user represented by the band **410**, has stacked four, five gallon water bottles **420***a*, **420***b*, **420***c* and **420***d* (generically a water bottle **420** and collectively water bottles **420**) on the hand cart **100**, one on each of the pairs of object supporting bars **130**. Each water bottle **420** generally comprises a generally cylindrical body portion **422**, a generally cylindrical neck portion **424** of a smaller diameter than the body portion **422**, and a joining portion **426** which extends from a joining end of the body portion **422** to a joining end of the neck portion **424**, the joining portion **426** comprising a curved surface of generally decreasing diameter towards the neck portion **424**. Each water bottle **420** has been accepted and is supported by a lining portion **150**, the weight of each water bottle **420** being translated to the frame portions **110** by the object supporting bars **130** (only the first frame portion **110***a* being visible in FIG. **4**). Further each water bottle **420** is oriented along a longitudinal axis (e.g. a cylindrical longitudinal axis) with respect to the object supporting bars **130**.

While in the embodiment depicted in FIG. **4**, the neck **424** of each water bottle **420** extends away from the handle portion **140***a*, in other embodiments, the orientation of each water bottle **420** when placed on the hand cart **100** is generally non-limiting, and the water bottles **420** may be placed on the hand cart **100** in an orientation where the neck **424** rests substantially between the first rail **115** of each fame portion **110**, as desired.

A person of skill in the art would understand from FIG. **4** that the user has gripped the handle portion **140***a* (i.e. via the hand **410**) and applied a moment of force to the hand cart **100** to disengage the supporting ends **128** of each the second rails **120** from the ground. A person of skill in the art would further understand that either the handle portion **140***a* or the handle portion **140***b* may used to transport the hand cart **100**, depending on which handle portion **140** is more ergonomically comfortable for the user.

In the depicted embodiment, the user may prefer to use the handle portion **140***a*, however, as a fifth water bottle **420'** has been stacked on top of the uppermost water bottle **420***a*. The water bottle **420'** is similar to a water bottle **420** as described and also comprises a body portion **422'**, a neck portion **424'**, and a joining portion **426'**, each of which is similar to the body portion **422**, the neck portion **424**, and the joining portion **426**, respectively. In this embodiment, the handle portion **140***b* is further enabled to prevent the water bottle **420'** from sliding between the first rail **115** of each of the first frame portion **110***a* and the second frame portion **110***b*, by abutting the joining portion **426'**, the neck portion **424'** extending towards the handle portion **140***a*. The configuration of the handle portion **140***b* is chosen accordingly, and is further depicted in FIG. **5**, described below. In other embodiments, however, the handle portion **140***b* is further enabled to prevent the water bottle **420'** from sliding between the first rail **115** of each of each of the first frame portion **110***a* and the second frame portion **110***b*, by abutting the bottom of the body portion **422'**, when the water bottle **420'** is oriented in a direction opposite to that depicted in FIG. **4**.

FIG. **5** depicts a rear plan view of the hand cart **100** of FIG. **1**, according to a non-limiting embodiment, the hand cart **100** stacked with the water bottles **420** and the water bottle **420'**, as in FIG. **4**, the hand cart **100** being in an upright position. FIG. **5** further depicts the interaction between each of the water bottles **420** and the object abutment portion **350**. Indeed, a person of skill in the art would understand that pairs of object abutment portions **350** (one object abutment portion **350** associated with each object supporting bar **350**), work in tandem to prevent a water bottle **420** from sliding towards the first rails **115**. For example, in embodiments where the first rails **115** are laterally separated by a dimension that is larger than the diameter of the body **422** of a water bottle **420**, the object abutment portion **350** prevents the water bottle **420** from sliding between the first rails **115**. In embodiments where the first rails **115** are laterally separated by a dimension that is less than the diameter of the body **422** (i.e. as in FIG. **4**) of a water bottle **420**, the water bottle **420** rests on the object abutment portion **350**, preventing the first rails **115** from interacting with the water bottle **420** and damaging it. Details of a non-limiting embodiment wherein the optional lining portion **150** comprises the object abutment portion **350** are depicted in FIG. **6**, with a water bottle **420** depicted in outline representing where the water bottle **420** would rest when placed on the optional lining portion **150**, similar to FIG. **5**.

In some embodiments, the object abutment portion **350** may comprise a material similar to the material of the lining portion **150**, as described above (for example in embodiments where the lining portion **150** comprises the object abutment portion **350**). In other embodiments, the object abutment portion **350** may comprise a material similar to that of the object supporting bars **130**, for example steel and/or iron and/or aluminum. In these embodiments, an object facing side of the object abutment portion **150** may further comprise a material that prevents damage to glass or plastic, such as high density polyethylene.

FIG. **5** further depicts the interaction between the water bottle **420'** and the handle portion **140***b*. A person of skill in the art would understand that the bottle **420'** is stacked on the uppermost bottle **420**, and is further being prevented from sliding off the hand cart **100** as the handle portion **140***b* is of a configuration that causes at least a portion of the handle portion **140***b* to abut the water bottle **420'**. Hence, in these embodiments, the handle portion **140***b* has a function similar to that of the object abutment portion **350**, and is accordingly configured with a suitable shape, such as the curved/hooped shape depicted in FIG. **5**.

FIG. **5** further depicts the interaction of the wheel assembly **145** with the first rail **115**. From this view, a person of skill in the art would understand that the wheel assembly **145** comprises at least an axle **520**. The wheel assembly **145** may further comprise at least two wheels **510**, the wheels **510** free to rotate about the axle **520**, and the axle **520** attached to the wheel end **126** of each of the first rails **115** via at suitable fastener assemblies **530**. As such the wheel assembly **145** provides additional stability between the two first rails **115**. In

some embodiments, the wheel assembly structurally joins the two first rails **115**, for additional support and stability between the frame portions **110**. In some embodiments, during manufacture, the hand truck **100** may be assembled without the wheels **510**, shipped to a second location, and the wheels **510** attached.

While the hand cart **100** has been described in specific embodiments with reference to the plurality of objects being water bottles, such as water bottles **420** and/or the water bottle **420'**, it is understood that the type of object is not to be considered particularly limiting and that the hand cart **100** may be enabled to transport a plurality of objects other than water bottles. For example, the hand cart **100** may be enabled to transport boxes, kegs of beer, and the like, the object supporting distance **132**, the object stacking distance **138**, and the object lining portion **150**, if present, being configured accordingly.

Further, while in specific embodiments the hand truck **100** is enabled to transport the plurality of objects when a longitudinal axis of the plurality of objects are substantially parallel to the object supporting bars **130**, in other embodiments the hand truck **100** may be enabled to transport the plurality of objects when the longitudinal axis of the plurality of objects are substantially perpendicular to the object supporting bars **130**. For example, it may be desired to enable the hand truck **130** to transport spools of wire, which are also awkward and heavy, and further to transport the spools of wire in a manner that conveniently allows a user to unspool wire from each spool. Hence, in these embodiments, each pair of object supporting bars **130**, such as the pair **135** in FIG. **1**, enabled to support a spool oriented perpendicularly between them. For example, each spool may comprise supporting portions that extend longitudinally from the center of the spool, and each object supporting bar **130** may be configured with generally aligned mating portions for receiving the supporting portions, for example an aperature (as in FIG. **7**), a groove, a kink and the like in the object supporting bar **130**, such that the longitudinal axis of the spool rests perpendicular to the that object supporting bars, and enable the spool to spin about the supporting portions when wire is unspooled.

Alternatively, as depicted in FIG. **7**, a spool supporting apparatus **700** may comprise a spool threading portion **710**, such as a dowel of a suitable material (e.g. wood and/or metal) and a pair of tabs **720***a* and **720***b*, each of which is provided with a first aperture **730** (or slot, groove, kink, and the like) for accepting the spool threading portion **710**. Each of the tabs **720***a* and **720***b* are further adapted for aligned attachment to an object supporting bar **130** in a pair of object supporting bars **130**. For example, in the depicted embodiment, each tab **720***a* and **720***b* further comprises at least a second aperture **740** for attaching the pair of tabs **720***a* and **720***b* to a pair of object supporting bars **130** (such as the pair **135** in FIG. **1**) via a nut and bolt assembly, and the like. Alternatively, the pair of tabs **720***a* and **720***b* may be attached to a pair of object supporting bars **130** via a weld, and the like. In any event, when the tabs **720***a* and **720***b* are alignedly attached to a pair of object supporting bars **130**, the tabs **720***a* and **720***b* extend generally upwards such that the first apertures **730** are aligned. In some embodiments, the portion of the tabs **720***a* and **720***b* which define the second aperture **740** (and/or the area to be welded) may be at an angle (e.g. approximately 90°) to enable the tabs **720***a* and **720***b* to extend generally upwards (or downwards) from the object supporting bar **130** to which each are attached. Hence the spool threading portion **710** may be inserted into each of the first apertures **730** such that the tabs **720***a* and **720***b* support the spool threading portion **710**, and any spool which is threaded onto the spool threading portion **710**. In some embodiments, the spool supporting portion **700** may further comprise apparatus **750** for removably attaching the spool threading portion **710** to the tabs **720***a* and **720***b* (such as a cotter pin and the like), each end of the spool threading portion **710** enabled to accept the apparatus **750**. In some embodiments, the spool threading portion **710** may be hingedly attached to one of the object supporting bars **30** in the pair, or a tab **720***a* or **720***b*, and enabled to rest on the other of the object supporting bars **30** in the pair, or the other of the tabs **720***b* or **720***a*.

FIG. **8** depicts a box **800** adapted for attachment to a pair of object supporting bars **130** (such as the pair **135** in FIG. **1**), for example via apertures **810** in tabs **820**, the tabs **820** separated by a distance similar to the distance separating a pair of object supporting bars **135**. Hence the box **800** may be attached to a pair of object supporting bars **130** via nut and bolt assemblies, and the like, via the apertures **810**. Alternatively, the box **800** may be attached to a pair of object supporting bars **130** via a weld, and the like. Hence, if the hand truck **100** is equipped with a box **800**, or a plurality of boxes each similar to the box **800**, the hand truck **800** may be used to transport a plurality of objects which have been inserted into the box **800** or the plurality of boxes.

FIG. **9** depicts a tray **900** adapted for attachment to a pair of object supporting bars **130** (such as the pair **135** in FIG. **1**), for example via apertures **910** in tabs **920**, similar to apertures **810** and tabs **820** described above. Hence the tray **900** may be attached to a pair of object supporting bars **130** via nut and bolt assemblies, and the like, via the apertures **910**. Alternatively, the tray **900** may be attached to a pair of object supporting bars **130** via a weld, and the like. Hence, if the hand truck **100** is equipped with a tray **900**, or a plurality of trays each similar to the tray **900**, the hand truck **900** may be used to transport a plurality of objects which have been placed onto the tray **900** or the plurality of trays. The tray **900** may further comprise a rear lip **930** for preventing objects from sliding off the tray **900** when the hand truck **100** is tilted for transport.

In some embodiments, the hand truck **100** is configurable, such that each pair of object supporting bars **135** may be configured with a lining portion **150**, a spool supporting portion **700**, a box **800** or a tray **900**. Hence the hand truck **100** may be configured to transport a plurality of objects of different types. Other types of object transporting apparatus that may be attached to the object supporting bars **130** may occur to a person of skill in the art and are within the scope of present embodiments.

Structural joins between the various elements of the hand cart **100** have been described in specific non-limiting embodiments with reference to welds and fasteners, however in other non-limiting embodiments, the structural joins between various elements of the hand cart **100** may be hinged structural joins. Such hinged structural joins enable the hand cart **100** to be folded up such that the first rail **115** and the second rail **120** are substantially parallel and adjacent, and the object supporting bars **130** fold towards the first rail **115**. In a particular non-limiting embodiment, each of the object supporting bars is hingedly attached to the object side face **310** of the first rail **115**, and when the hand cart **100** is in an open position, rests on a pin extending from the second rail **120**, such that the second rail **120** structurally supports an object supporting bars **130** via the pin. In some of these embodiments, each object support bar **130** may further comprise a groove for receiving the pin to frictionally couple the object supporting bar **130** to the second rail **115**, providing additional stability to the hand cart **100**, when the hand cart **100** is in an open position.

Persons skilled in the art will appreciate that there are yet more alternative implementations and modifications possible for implementing the embodiments, and that the above implementations and examples are only illustrations of one or more embodiments. The scope, therefore, is only to be limited by the claims appended hereto.

What is claimed is:

1. A hand truck for transporting a plurality of objects, comprising,

a first frame portion and a second frame portion, each of which comprises:

a first rail and a second rail, structurally joined proximal a handle end of each said rail; and

a plurality of object supporting bars extending from said first rail to said second rail, each of said plurality of object supporting bars structurally supported by said first rail and said second rail, and separated from an adjacent object supporting bar by a distance approximate a stacking dimension of one of the plurality of objects,

said second frame portion laterally spaced from said first frame portion by an object supporting distance, such that said plurality of object supporting bars of said first frame portion and said plurality of object supporting bars of said second frame portion form a plurality of pairs of object supporting bars, each of said plurality of pairs of object supporting bars being substantially parallel and enabled to support at least one of the plurality of objects when the hand truck is in an upright position;

a handle portion proximal to, and structurally joining, a handle end of said first frame portion and a handle end of said second frame portion; and

a wheel assembly joining said distal ends of each of said first rails of each of said first frame portion and said second frame portion.

2. The hand truck of claim **1**, wherein a wheel end of said first rail is separated from a supporting end of said second rail by a hand truck supporting distance, each of said wheel end of said first rail and said supporting end of said second rail distal from said handle end, said hand truck supporting distance comprising a distance that enables the hand truck to freely stand when the hand truck is in an upright position, the hand truck being supported by said wheel assembly and said supporting ends of each said second rail.

3. The hand truck of claim **2**, wherein said supporting end of each said second rail of said first frame portion and said second frame portion are structurally joined by a toe strip.

4. The hand truck of claim **1**, wherein each of said plurality of object supporting bars are structurally joined to said first rail and said second rail.

5. The hand truck of claim **1**, wherein for each of said first frame portion and said second frame portion, said first rail and said second rail form an angle, a narrow end of said angle located proximal said handle end of each said rail, a wide end of said angle formed by a wheel end of said first rail and a supporting end of said second rail.

6. The hand truck of claim **1**, wherein for each of said first frame portion and said second frame portion, said first rail and said second rail are structurally joined proximal said handle end of each said rail by one of said plurality of object supporting bars.

7. The hand truck of claim **1**, wherein for each of said first frame portion and said second frame portion, said first rail and said second rail are structurally joined proximal said handle end of each said rail by at least one of a structural fastener and a weld.

8. The hand truck of claim **1**, wherein for each of said first frame portion and said second frame portion, said first rail and said second rail are structurally joined proximal said handle end of each said rail by a joining portion which substantially separates said first rail and said second rail at said handle end of each said rail.

9. The hand truck of claim **8**, wherein said first rail and said second rail are substantially parallel.

10. The hand truck of claim **1**, wherein each of said plurality of pairs of object supporting bars are joined by a lining portion adapted to accept and support said one of the plurality of objects, the weight of said one of the plurality of objects being translated to the first frame portion and the second frame portion by at least one of a pair of the object supporting bars and an associated lining portion.

11. The hand truck of claim **10**, wherein said lining portion comprises a belly strap extending between each of said plurality of pairs of object supporting bars, said belly strap for engaging at least a portion of said one of the plurality of objects.

12. The hand truck of claim **10**, wherein each of the plurality of objects comprises at least one of glass and plastic, and said lining portion is enabled to prevent damage to said glass and plastic.

13. The hand truck of claim **12**, wherein said lining portion comprises a plastic material.

14. The hand truck of claim **12**, wherein said lining portion comprises at least one of high density polyethylene (HDPE), polyvinyl chloride (PVC) and Kevlar.

15. The hand truck of claim **10**, wherein said lining portion comprises a flexible lining portion enabled to grip said one of the plurality of objects.

16. The hand truck of claim **10**, wherein each of the plurality of objects comprise a five gallon water bottle.

17. The hand truck of claim **10**, wherein said lining portion comprises an object abutment portion extending from an end adjacent said first rail, said object abutment portion for preventing said one of the plurality of objects from sliding towards said first rail of each of said first frame portion and said second frame portion.

18. The hand truck of claim **1**, wherein each of said plurality of object supporting bars is tilted towards said handle end of said first rail, forming an acute angle with said first rail, such that said one of the plurality of objects slides towards said first rail when supported by one of said plurality of pairs of object supporting bars, when the hand truck is in an upright position.

19. The hand truck of claim **1**, wherein each of said plurality of object supporting bars comprises an object abutment portion extending from an end adjacent said first rail, said object abutment portion for preventing said one of the plurality of objects from sliding towards said first rail of each of said first frame portion and said second frame portion.

20. The hand truck of claim **1**, further comprising a second handle portion proximal to, and structurally joining, a handle end of said first frame portion and a handle end of said second frame portion, wherein said handle portion enables a user to apply a moment of force to the handcart to disengage said supporting ends of each said second rails from the ground and ergonomically transport the hand cart via said wheel assembly when the hand cart is in a substantially upright position, and said second handle portion enables a user to ergonomically transport the hand cart via said wheel assembly when the hand cart is in a substantially tilted position.

21. The hand cart of claim **20**, wherein when said one of the plurality of objects is supported by an uppermost pair of object supporting bars, said second handle portion is further

enabled to prevent another one of the plurality of objects stacked on said one of the plurality of objects from sliding between said first rail of each of said first frame portion and said second frame portion.

22. The hand cart of claim **1**, wherein said plurality of pairs of object supporting bars comprises a bottommost pair extending from said wheel end of each said first rail, an uppermost pair extending proximal said handle end of each said first rail, and at least two middle pairs evenly spaced between said bottommost pair and said uppermost pair.

23. The hand truck of claim **1**, wherein said first frame portion and said second frame portion comprise at least one of steel and aluminum.

24. The hand truck of claim **1**, wherein said first rail and said second rail are structurally joined proximal a handle end of each said rail via a hinge, and said plurality of object supporting bars extending from said first rail to said second rail are structurally joined to said first rail via another hinge.

25. The hand truck of claim **1**, further comprising at least one of a lining portion, a spool supporting portion, a box or a tray extending between at least one of said pairs of object supporting bars.

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